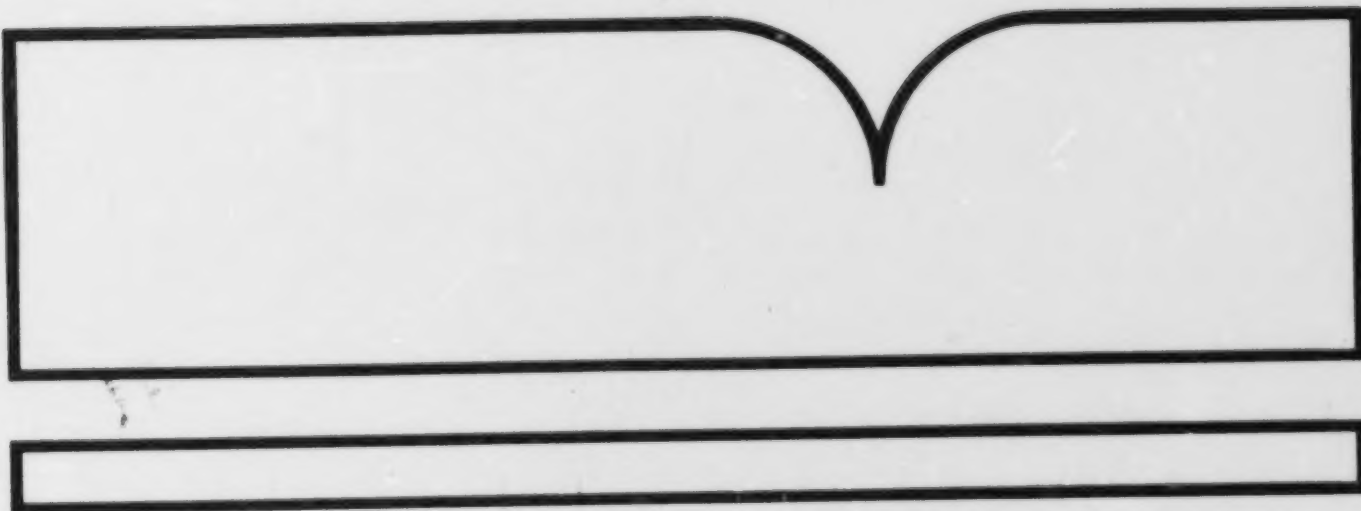


Technical Assistance to Franklin County, Florida

CSI Resource Systems, Inc.
Boston, MA

Prepared for
Environmental Protection Agency
Atlanta, GA

Oct 81



U.S. Department of Commerce
National Technical Information Service

NTIS

REPORT DOCUMENTATION PAGE		1. REPORT NO.	2.	3. Recipient's Accession No. <i>PB82-208695</i>
4. Title and Subtitle Technical Assistance to Franklin County, Florida			5. Report Date September 1981	
7. Author(s)			6.	
9. Performing Organization Name and Address CSI Resource Systems, Inc. Boston, Massachusetts			8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address Office of Solid Waste Management U.S. Environmental Protection Agency Region IV, Atlanta, Georgia			10. Project/Task/Work Unit No. Work Assignment 21	
			11. Contract(C) or Grant(G) No. (C) 68-01-6004 (G)	
15. Supplementary Notes			13. Type of Report & Period Covered	
			14.	
16. Abstract (Limit: 200 words) This report summarizes the results of an analysis of Franklin County, Florida's solid waste collection system and the feasibility of resource recovery from solid waste for the County. This study includes the collection systems of the County's two largest cities: Apalacicola and Carrabelle. The relatively small quantity of refuse produced in Franklin County, and the apparent absence of a compatible market for resource recovered energy, indicates that the concept of resource energy recovery is infeasible at this time.				
17. Document Analysis a. Descriptors Solid Waste; Resource Recovery; Landfills; Emergency Action Plan b. Identifiers/Open-Ended Terms Franklin County (Florida) Apalacicola (Florida) Carrabelle (Florida) c. COSATI Field/Group				
18. Availability Statement Release to Public		19. Security Class (This Report) Unclassified		21. No. of Pages 42
		20. Security Class (This Page) Unclassified		22. Price 0

2B82-208695

United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta, GA 30365

OCTOBER 1981

Solid Waste



A TECHNICAL ASSISTANCE PROGRAM REPORT

Technical Assistance
To
Franklin County, Florida

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

Public Law 94-580 - Oct. 21, 1976

Technical assistance by personnel teams. 42 USC 6913

RESOURCE RECOVERY AND CONSERVATION PANELS

SEC. 2003. The Administrator shall provide teams of personnel, including Federal, State, and local employees or contractors (hereinafter referred to as "Resource Conservation and Recovery Panels") to provide States and local governments upon request with technical assistance on solid waste management, resource recovery, and resource conservation. Such teams shall include technical, marketing, financial, and institutional specialists, and the services of such teams shall be provided without charge to States or local governments.

This report has been reviewed by the Project Officer, EPA, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Project Officer: Elmer G. Cleveland

U. S. ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL ASSISTANCE PROGRAM REPORT SERIES

TECHNICAL ASSISTANCE TO
FRANKLIN COUNTY, FLORIDA

PREPARED FOR
OFFICE OF SOLID WASTE MANAGEMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, ATLANTA, GEORGIA

BY

ENGINEERING-SCIENCE, INC.
ATLANTA, GEORGIA

AND

CSI RESOURCE SYSTEMS, INC.
BOSTON, MASSACHUSETTS

SEPTEMBER 1981

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CHAPTER 1

OVERVIEW

CHAPTER 1

OVERVIEW

Franklin County is located on the Florida Panhandle approximately 50 miles southwest of Tallahassee, the state capital. The County has approximately 9,000 permanent residents; during the peak summer tourist season, the population almost doubles. Apalachicola, the county seat and largest city, has approximately 3,600 residents. The county is about 50 miles wide (east to west) by 20 miles (north to south), and covers approximately 300,000 acres. There is no heavy industry and the major commercial activity is fishing.

Franklin County operates a green-box refuse collection system in rural areas; both city and county waste is deposited in a landfill.

In response to the county's request to the U.S. Environmental Protection Agency (EPA), Region IV for assistance in evaluating the feasibility of resource recovery from solid waste, a preliminary assessment of the county's waste management system was conducted. This study had four objectives:

- o Evaluate the preliminary feasibility of materials and energy recovery
- o Review current collection and landfill operations
- o Develop future waste load projections
- o Outline the required content of an Emergency Action Plan for solid waste management.

This chapter provides an overview of the major findings and conclusions resulting from the on-site analyses conducted to achieve these objectives.

RESOURCE RECOVERY

The relatively small quantity of refuse (approximately 6,300 ton/year) produced in Franklin County, and the apparent absence of a compatible market for resource recovered energy indicates that the concept of resource energy recovery is infeasible at this time. Further obstacles to

the implementation of an energy recovery facility are possible zoning restrictions and hazardous weather conditions.

On the basis of an estimate of the quantity of materials available for recycling, it is unlikely that a centralized "high technology" materials recovery facility could be economically justified for Franklin County. However, it is possible that a source separation program could be successfully implemented. As described in Chapter 2, a preliminary survey indicates that potential markets exist for recovered paper, glass, aluminum and ferrous metal. The economic feasibility of a source separation program will depend on the costs associated with collection, separation, and transportation of the materials as well as variable market conditions.

SOLID WASTE COLLECTION

Franklin County operates a green-box type rural refuse collection system. The two largest cities, Apalachicola and Carrabelle, operate their own door-to-door collection systems. The County system collects refuse daily from 50 to 100 4-cu yd bins (depending on the season) using two 16-cu yd, side-load packers.

The County green-box system differs from other rural systems serving similar populations. Its refuse holding capacity is about 0.25 cu yd per person per week, a relatively high per capita capacity compared to similar rural systems. However, per capita collection costs of the County system are lower than compared to other systems with similar capacities. Franklin County empties collection bins daily, whereas other systems collect wastes one to three times per week. As described in Chapter 3, Franklin County could reduce collection system costs by about 20 percent by increasing the number of bins and reducing the number of pickups.

LANDFILL

Franklin County operates a landfill in the south-central portion of the County, approximately 13 road-miles from Apalachicola. The landfill system and environmental/economic characteristics are described in Chapter 4. The landfill accepts waste from the County green-box collection system, municipal collection systems, contract haulers, private citizens and commercial establishments. No refuse tipping fee is presently charged.

At present, about 1.5 of the permitted 7 acres have been filled.

The landfill site has poor natural conditions, including poor surface drainage, permeable soils and high groundwater. However, these geotechnical conditions characterize much of the available land in the County and it is possible that significantly better locations are not available. Several procedures are noted in Chapter 4 which should help to minimize the adverse environmental impact of the landfill. Hazardous wastes should not be deposited at the Franklin County landfill.

The landfill property has been loaned to the County by a paper company. It requires only minimal personnel and equipment: one supervisor, one equipment operator, and one loader/compactor. The unit cost for the landfill (\$/ton) is probably quite high; however, due to the small size of the operation, significant operating cost reductions are not likely.

FUTURE WASTE LOAD PROJECTIONS

The current refuse production rate is about 6,000 ton/yr which is estimated to increase to 8,000-9,000 ton/yr by the year 2001, based on the present and projected resident population of Franklin County. The 2001 estimate corresponds to about 19,000 to 22,000 cu yd/yr (at landfilled density) and a landfill area usage of about 1 to 2 acres/yr. The estimates were made based on resident population, however; seasonal tourist influx could increase the annual estimates by as much as 25 percent.

EMERGENCY ACTION PLANNING

Franklin County is located on Florida's Gulf Coast and is vulnerable to hurricane, tornado, and other severe weather damage. As a result, an outline for an Emergency Action Plan was formulated (see Chapter 6). This outline identifies areas requiring investigation before the preparation of such a plan, such as equipment availability, available state and federal financial assistance, work force availability, and emergency coordination. Procedures for response to a severe storm damage emergency are outlined.

The remainder of this reports discusses each of these findings and conclusions in greater detail. In addition, Appendix A includes a brief description of three resource energy recovery options that were found to

be inappropriate for adoption by Franklin County; Appendix B outlines methodologies used in calculating future population growth (on which waste load projections are based); and Appendix C is the methodology used to calculate the economic feasibility of transporting refuse to energy markets.

CHAPTER 2
RESOURCE RECOVERY OPTIONS

CHAPTER 2

RESOURCE RECOVERY OPTIONS

Franklin County currently produces an estimated 6,300 ton/yr refuse, or about 16,000 cu yd/yr. Because the County has never conducted a refuse-weighing program, an average production rate of 4 lb/person/day was used to estimate current refuse generation. This rate is the average per capita refuse production rate for similar rural areas with little or no industrial activity. (Chapter 5 projects future annual waste loads for 1986, 1991, and 2001, based on estimates of future population and industrial/commercial growth in Franklin County.)

This section is a preliminary assessment of the feasibility of an energy and/or materials recovery program in Franklin County. Four generic processes were considered:

- o Incineration with waste heat recovery to produce steam
- o Coarse shredding of municipal solid waste (MSW) to produce a supplemental solid fuel for firing in existing industrial boilers
- o Methane gas production from existing landfill for use as supplemental fuel by natural gas consumers
- o Recovery and resale of recyclable materials by separating paper, glass, aluminum, and ferrous metals from refuse.

However, the first three options are not currently economically feasible because of four key constraints:

- o Limited solid waste resources
- o High capital costs of recovery processes
- o Few nearby energy markets
- o Environmental restrictions

In contrast, materials recovery and resale seems to offer some potential revenue to Franklin County (See Table 2.1.) However, economic success depends on two factors:

- o An extensive organization and publicity campaign must be conducted to ensure cooperation in separating recoverable materials

TABLE 2.1
ESTIMATED RECYCLABLE MATERIALS RECOVERY USING HIGH TECHNOLOGY

Portion of Solid Waste Stream (%)	Estimated Quantity in Franklin Co. Solid Waste (ton/yr)	Maximum Amount Recoverable by High Technology Method (%)	Maximum Amount Recoverable From Solid Waste Stream (100 Ton/yr)	Recovered Material Value (\$/Ton)	Maximum Gross Revenue Generated (\$/Year)
Paper	14	70	6.2	25	15,500
Glass	9	60	3.4	20	6,800
Ferrous Metal	4	100	2.6	40	10,400
Aluminum Cans	1	90	0.5	600	30,000
MAXIMUM TOTAL REVENUE					\$62,700/Year

1. From "Refuse Report," International City Management Association, July-September Issue, 1978, Volume 4, Number 3.

2. Based on projections outlined in Chapter 5.

3. From "1980 Sanitation Industry Yearbook," Solid Waste Management, 17th Edition, 1980.

4. Based on Aug. 1981 preliminary market survey.

5. Gross Revenue from sale of material. Does not reflect costs associated with collection, separation, or transport of materials to buyer.

- o The cost of collection, separation, and transportation to markets for reclaimable materials must not exceed prevailing market prices (which, at present, are highly variable).

In the remainder of this chapter, the techniques involved in materials separation and the results of a preliminary survey of potential markets for recycled materials are discussed. The three resource energy recovery options that were rejected - incineration, solid fuel production, and methane production -- are described briefly in Appendix A.

MATERIAL RECOVERY TECHNIQUES

Two basic methods are commonly used to separate and gather reclaimable materials from municipal refuse:

- o Centralized facilities for materials separation
- o Source separation by commercial and residential producers.

The selected method primarily depends on the quantity of recyclable materials in the waste stream, the revenues available from marketing of the reclaimed wastes, and the costs associated with the materials separation method.

Centralized Materials Separation

Centralized materials separation involves manually or mechanically segregating the mixed solid waste stream at a central facility. The marketable materials are stored for shipment to buyers while the non-salable portion of the waste is hauled to the refuse disposal site. The manual separation of materials on a large scale is quite expensive and can pose health hazards for personnel.

The mechanical methods currently used for materials separation include magnetic separation (recovery of ferrous metals), air classification (separation of waste into components by density) and froth flotation (separation of glass). These methods for centralized materials separation will be referred to as "high technology" methods for the purposes of this report.

Centralized high technology facilities for mechanical separation of materials require substantial capital investments. For example, the average capital cost was about \$24,000 per ton/day (TPD) of capacity (the

range of the TPD unit costs was \$5,000-\$75,000), for 20 facilities that were operating, under construction, or being planned in 1978. The capacities of these facilities ranged from 150 to 3000 TPD.

Based on an estimated commercial and residential solid waste production rate of 17 TPD for Franklin County and a unit capital cost of \$24,000 per TPD capacity, a centralized mechanical materials separation facility would require an estimated initial expenditure of about \$410,000. However, because of economies of scale and the relatively low waste production rate in Franklin County, the installation could cost much more.

Gross revenues from sales of recyclable materials that could be recovered from the county solid waste stream by high technology methods are estimated in Table 2.1, based on the results of a preliminary market survey (which is documented in the next section of this chapter). The maximum gross revenue that could be generated from a materials recovery program in Franklin County is approximately \$62,700/yr, not including the costs associated with the collection, separation and transport of recovered materials to markets. It is unlikely that the relatively small amount of revenue that could be generated from a materials recovery program in Franklin County could justify the high capital and operating costs of a centralized high technology separation facility.

Source Separation

Source separation is the most practical approach to materials recovery in Franklin County because of its capital cost and relative success in similar small communities.

Marketable materials can also be separated from solid waste at the source of production (e.g., homes, commercial buildings). For example, a household could place aluminum cans into one container, glass into another, bag or bundle newspaper separately and deposit all other refuse into a third container. On collection day the segregated wastes are collected and placed in different compartments of the refuse collection vehicle or picked up by separate vehicles. The marketable materials are recovered and stored at a central location for shipment to buyers. The nonsalable refuse is hauled to the disposal site.

Source separation efforts can be relatively inexpensive but require public support and participation. A number of techniques have been used to inspire public cooperation, including:

1. Informing the public that the revenues derived from the materials recovery program will be used to help control solid waste collection costs and thus minimize rate increases.
2. Using revenues for highly visible civic improvements (e.g., new public buildings, park improvements).
3. Providing homeowners with color-coded refuse bags to speed up separation and collection.
4. Promoting the reclamation project via radio, television, and newspaper advertisements, or by mail. (see Figure 2.1).
5. Passing of City ordinances that mandate refuse separation.

It usually takes a relatively long period to achieve a high level of public participation in a source separation program. For example, it required about 4 years to involve 80 percent of the public in one newspaper recycling program (see Figure 2.2). Franklin County should study successful incentives based on similar areas and expect low levels of public cooperation for a relatively long period.

PRELIMINARY MATERIALS MARKET SURVEY

A preliminary survey of potential markets for recycled paper, glass, aluminum, and ferrous metal was performed. Purchasers of recovered materials in Florida and Georgia were contacted. The results of this survey are presented (by material type) in the following subsections.

Paper

Two potential markets for reclaimed paper were contacted: firms that buy and sell waste paper (secondary market), and paper mills that buy waste paper for their own use (primary market).

Several secondary buyers were contacted in North Florida. The Florida Rag Company in Jacksonville was representative of the prevailing market. The dealers indicated a willingness to buy waste paper from Franklin County. No shipping is provided by the stock dealers. The reclaimed paper does not need to be baled, but it must be strictly segregated into newspaper, corrugated, and mixed (magazines, office, etc.) classifications to receive the highest price. Mixed paper receives the lowest quality paper price.

PROMOTIONAL ADVERTISEMENT FOR
NEWSPAPER RECYCLING PROGRAM
IN DEKALB COUNTY, GEORGIA



DeKalb County Newspaper Recycling Program
Three Ways to Recycle Your Newspaper:

1. Curbside Collection: Tie newspapers in bundles or place them in a grocery sack.* Put at the curb on your regular trash collection day.
2. Deposit your newspaper in the specially marked containers at major shopping centers in the County.
3. Support newspaper drives held by churches, schools and charitable organizations.

**Please include only newspaper — NO MAGAZINES!*



Good Reasons to Recycle:

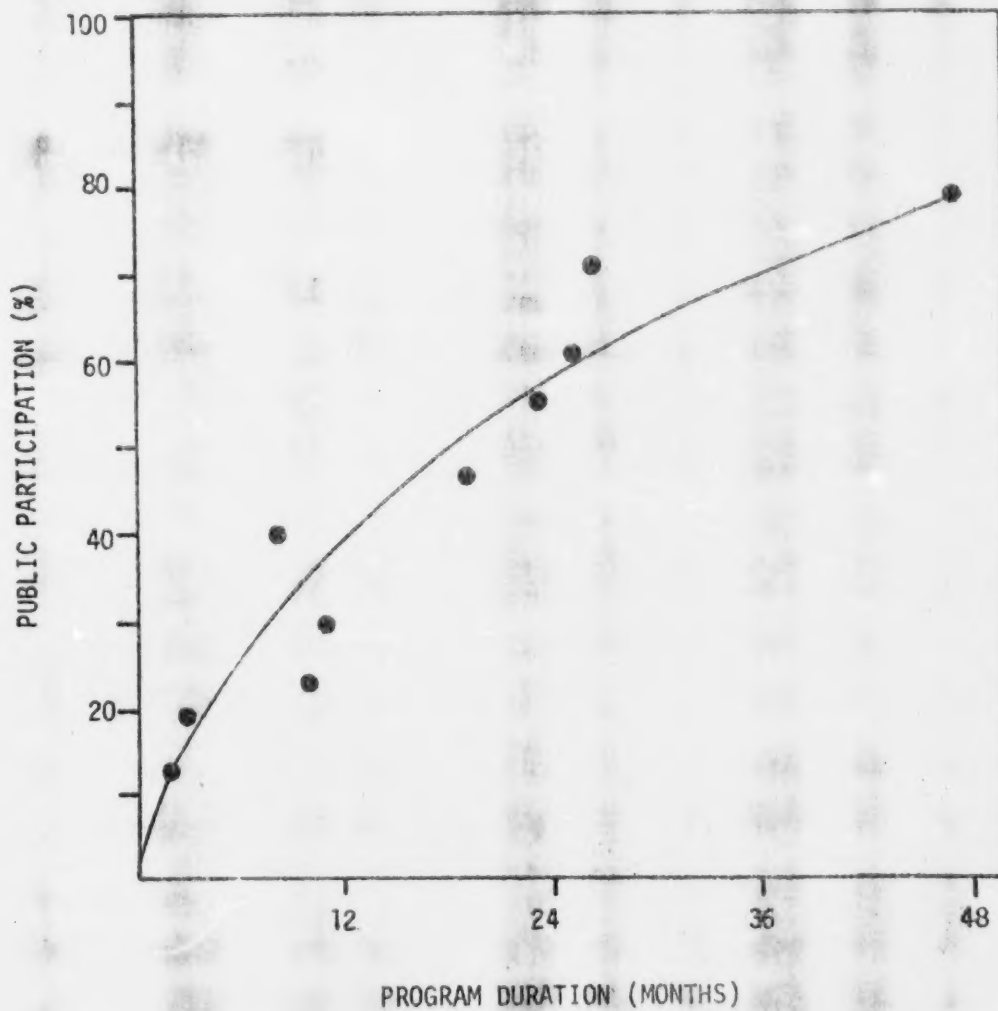
Landfill space is scarce and expensive. Each ton of newspaper recycled saves three cubic yards of landfill space.
Newspaper can be recycled several times. Use of recycled fiber conserves forest resources and energy.
Revenues from sale of your used newspapers go into the Sanitation Fund to help defray the costs of garbage collection.

Remember:

If you do place your newspaper at the curb, it becomes County property and only the County may collect it. If you see anyone else taking it, please call the County Sanitation Department at 294-2100.

CARD WAS DISTRIBUTED WITH RESIDENTIAL WATER/SEWER/GARBAGE BILL.

USED BY PERMISSION OF HENRY FOGG, DEKALB COUNTY SANITATION DEPARTMENT.

PUBLIC PARTICIPATION IN A NEWSPAPER RECYCLING PROGRAM*

P.A. Vesilind, D. Warner, "Cities Should First Consider the Various Resource Recovery Systems," Solid Wastes Management, May 1978, Page 63.

Table 2.2 gives the prices currently being paid by area dealers, haul distances, and estimates of net revenues (i.e., the price paid for the paper less the cost for hauling the paper to the buyer). (Table 2.2 does not include other costs associated with collecting, separating and storing the paper.)

Operators of a paper recycling program should establish contacts in several market areas and monitor current price fluctuations closely to minimize the net program revenues. The waste paper market has been relatively stable in the last year, but prices often vary widely. For example, corrugated prices have dropped to \$25/ton and occasionally there is no market at all for newspaper or mixed paper.

There is no primary market for recycled paper, according to the preliminary market survey. Of four papermills contacted, only one (Southeast Paper Mfg. Co. in Dublin, GA) purchases recycled paper, but the 220-mile haul from Franklin County makes the delivery and sale economically infeasible.

Glass

Recycling glass might be slightly profitable according to the market survey. The American Glass and Reclaiming Corporation in Jacksonville is the closest glass recycler to Franklin County. It accepts clear and amber, non-laminated glass, including jars and bottles. The glass must be relatively clean and empty. Paper labels on glass are acceptable. Glass separated by color commands a higher price than mixed clear and colored glass. Based on its August 1981 price of \$20/ton of color-segregated glass, a haul cost of \$0.125/ton-mile and a haul distance of 245 miles, the haul would not be economically feasible (net loss of \$10/ton). However, American Glass provides the collection container and hauls the glass itself. A more detailed study is required to determine if this arrangement is actually economically feasible.

Aluminum

Two types of scrap aluminum buyers in Florida offer potential markets for Franklin County products: large aluminum producers with recycling divisions and recovered materials brokers.

The Reynolds Aluminum Company operates a recycling center in Tallahassee, paying \$500/ton for aluminum cans, \$400/ton for miscellaneous scrap aluminum and \$300/ton for cast aluminum. Reynolds does not pick-up

TABLE 2.2
STOCK DEALER WASTE PAPER PRICE SUMMARY

JACKSONVILLE (1)			TALLAHASSEE (2)			
Paper Type	August 1981 (3) Price (\$/Ton)	Haul Distance (4) (Miles)	Net Revenue (5) (\$/Ton)	August 1981 (3) Price (\$/Ton)	Haul Distance (4) (Miles)	Net Revenue (5) (\$/Ton)
Mixed	5	245	NE (6)	--	80	--
Newspaper	20	245	NE (6)	20	80	10.00
Corrugated	34	245	3.38	25-35	80	15-25
White Bond Paper	60	245	29.38	65	80	55.00
Computer Print-Out	80	245	49.38	100	80	90.00

1. Price information provided by Florida Rag Company, Jacksonville.
2. Price information provided by Southwest Forest Industries, Panama City.
3. Price paid for paper delivered to buyer's location.
4. Approximate distance from Apalachicola.
5. Price paid for paper minus the cost of hauling the paper to the buyer. Haul cost was estimated at \$0.125/ton-mile. Costs associated with collecting, storing, or segregating the waste paper are not included.
6. Not economically feasible; haul cost exceeds price paid for paper.

metal, however, so that the cost of the haul to Tallahassee must be paid by Franklin County (estimated at about \$8/ton).

Coastal Metals, Inc., in Panama City and Capital Recycling Company in Tallahassee are materials brokers interested in buying aluminum. Capital Recycling pays \$500/ton and Coastal Metals offers \$600/ton for cans. Being slightly closer and offering a better price, Coastal Metals appears to be the best potential purchaser of Franklin County's recovered aluminum.

Ferrous Metal

The present potential for profitable recycling of iron, steel and other scrap metals seems relatively low, because of the slump in demand for steel and high transportation costs. A number of iron and metal scrap yards were contacted in the Tallahassee/Panama City area. Leon Iron and Metal Company in Tallahassee is typical, paying roughly \$10/ton for general metal. Coastal Metals, in Panama City, accepts more recycled metals; it pays a higher per-ton price, roughly \$40/ton, for appliances and other ferrous metals. Although Coastal does not accept scrap automobiles, a scrap metal dealer brings a portable auto-crusher to Franklin County once per year, paying individuals about \$35 per car.

A survey of other area dealers would provide a more comprehensive picture of the ferrous metal recovery potential in Franklin County.

One of the most cost-effective methods available for scrap metal segregation is to designate an area at the landfill for the deposition of large metal items. This practice would minimize collection and separation costs, as metal is allowed to accumulate for intermittent truck pick-up. Franklin County should establish a business relationship with a scrap hauler and buyer because the volume of scrap metal generated would not justify purchase of loading or transport equipment by Franklin County.

CHAPTER 3
REFUSE COLLECTION SYSTEM

CHAPTER 3

REFUSE COLLECTION SYSTEM

Franklin County operates a green-box refuse collection system. The Cities of Apalachicola and Carrabelle, within Franklin County, own and operate their own door-to-door refuse collection systems. All refuse is deposited at the County landfill (see Chapter 4). This chapter provides an overview of the current collection system and costs and an analysis of potential methods for reducing costs.

CURRENT WASTE COLLECTION PROCEDURES AND COSTS

Franklin County services approximately 15 refuse deposit stations throughout the County. From one to six bins are located at each site depending on the location and season of the year. In winter, 50 bins are used, while 90 to 100 are placed during summer months when tourists almost double the population.

The refuse deposit stations are serviced by two County-owned and-operated packer vehicles. The packers are 16-cu yd side loaders that mechanically empty the 4-cu yd bins five days per week. The collection crews consist of two or three persons and have the responsibility of "policing" the areas around the refuse bins.

Table 3.1 presents operating and cost information for a number of green-box type rural refuse collection systems including Franklin County. Of the 14 systems listed, Franklin County provides one of the higher per capita waste storage volumes (4 persons per cu yd per week or 0.25 cu yd per person per week).

During winter, about 4,000 people outside Apalachicola and Carrabelle use the green-box system. The capital cost (adjusted to 1981\$) for the equipment utilized during the winter is \$100,000 or about \$25/person (2 packers, 50 bins). The capital cost including all 100 bins in use during

TABLE 3.1

RURAL GREEN-BOX REFUSE COLLECTION SYSTEMS

Location	Estimated Population	Number of Con- tainers	Size of Container (cu yd)	Collec- tions per week	Number of persons per week	Number of trucks	Size of Trucks (cu yd)	(1) Initial Capital Cost (\$)	(2) Adjusted 1981 Capital Cost (\$)	1981 Per Capita Cost (\$/person served)
Franklin Co., FL										
Winter	4,000 (3)	50	4	5	4	2	16	83,000 (5)	100,000	25.0
Summer	8,000 (4)	100	4	5	4	2	16	105,000 (6)	130,000	16.3
Chilton Co., AL	17,000	91	4	3	16	2	30	68,000	170,000	10.0
Coffee Co., AL	14,000	170	4	1-2	14	1	30	62,700	150,000	10.7
Macon Co., AL	13,800	137	4	1-2	17	1	30	55,900	140,000	10.1
Tuscaloosa Co., AL	30,000	335	5.6	2	7	5	30	310,000	760,000	25.3
Clark Co., AK	11,702	142	3.4, 6	3	6	1	30	76,058	190,000	16.2
Evans Co., GA	7,290	10	3	2-3	9	2	23	60,695	150,000	20.5
Grady Co., GA	10,000	126	4	2	10	1	20	49,787	120,000	12.0
Screven Co., GA	9,500	146	4	2	7	1	25	66,000	160,000	16.8
Bonner Co., ID	3,000	39	10	2	4	1	20	38,400	94,000	31.3
Boundary Co., ID	2,300	17	10	2	7	1	20	17,540	43,000	18.7
Humphreys Co., TN	3,796	114	6	2	4	2	31	105,465	260,000	29.5
Jefferson Co., TN	17,014	128	4	2	14	1	30	68,310	170,000	10.0
Polk Co., TX	9,500	116	4	1	5	2	30	93,086	230,000	24.2

Note: Data for systems other than Franklin County taken from "Decision-Makers Guide in Solid Waste Management," U.S. EPA, 1976.

1. Capital cost for systems other than Franklin County range from 1968-1973. Franklin capital cost calculated in 1978.
2. Capital costs adjusted using ENR construction cost indexes (CCI).

Franklin - (1981 CCI)/(1978 CCI) = 3376/2776 = 1.22
Others - (1981 CCI)/(1978 CCI) = 3376/1385 = 2.44

3. Per capita capital costs are directly comparable because of differences in waste volume capacity.
4. Winter (permanent) population not including Apalachicola and Carrabelle. These cities have their own collection systems.
5. Includes permanent population plus estimated 10% increase during peak summer months. Apalachicola and Carrabelle not included.
6. Two trucks @ \$30,000 each plus 36 bins @ \$450 each.
7. Two trucks @ \$30,000 each plus 120 bins @ \$450 each.

the summer is about \$130,000 or \$16/person based on the 8,000 seasonal population figure.

It is not appropriate to directly compare the per capita capital costs of all the systems presented in Table 3.1 since all do not provide the same waste volume capacity. Figure 3.1 shows a plot of green-box system capacity versus per capita capital cost. It can be seen from Figure 3.1 that the Franklin County system's per capita capital cost is somewhat lower than the trend established by the other collection systems.

ALTERNATIVES FOR REDUCING COSTS

Franklin County empties bins 5 days per week, unlike the other systems listed in Table 3.1 which collect refuse from one to three times weekly. Franklin County could significantly reduce its collection costs by increasing the available refuse storage volume and decreasing the number of weekly pick-ups. Although littering around bins is a significant problem, it is believed that a reduction in pick-up frequency would not increase litter problems if sufficient storage capacity is available and if litter laws are enforced.

The cost estimates in Table 3.2 indicate that Franklin County could save about \$26,000 per year (20 percent of present costs) by adopting a collection system using 1 packer and 167 bins with 3 pick-ups per 6-day week. Both the current and the proposed systems have an effective capacity of 2,000 cu yd/week. The proposed one-packer system would require about 2 trips to the landfill site in the winter and about 3 trips in the summer tourist season.

The proposed one-packer, alternate-day pick-up system will reduce costs by eliminating the need for one of the two present collection crews. Also packer ownership and operation costs should be reduced. The extra packer should be maintained for use as a reserve vehicle in case of breakdowns.

County waste management costs could also be reduced by improving the enforcement of anti litter laws. Because of the present volume of litter around the bin areas, the County must hire 3-person crews -- 2 to complete

GREEN BOX SYSTEM CAPACITY VS. PER CAPITA CAPITAL COST

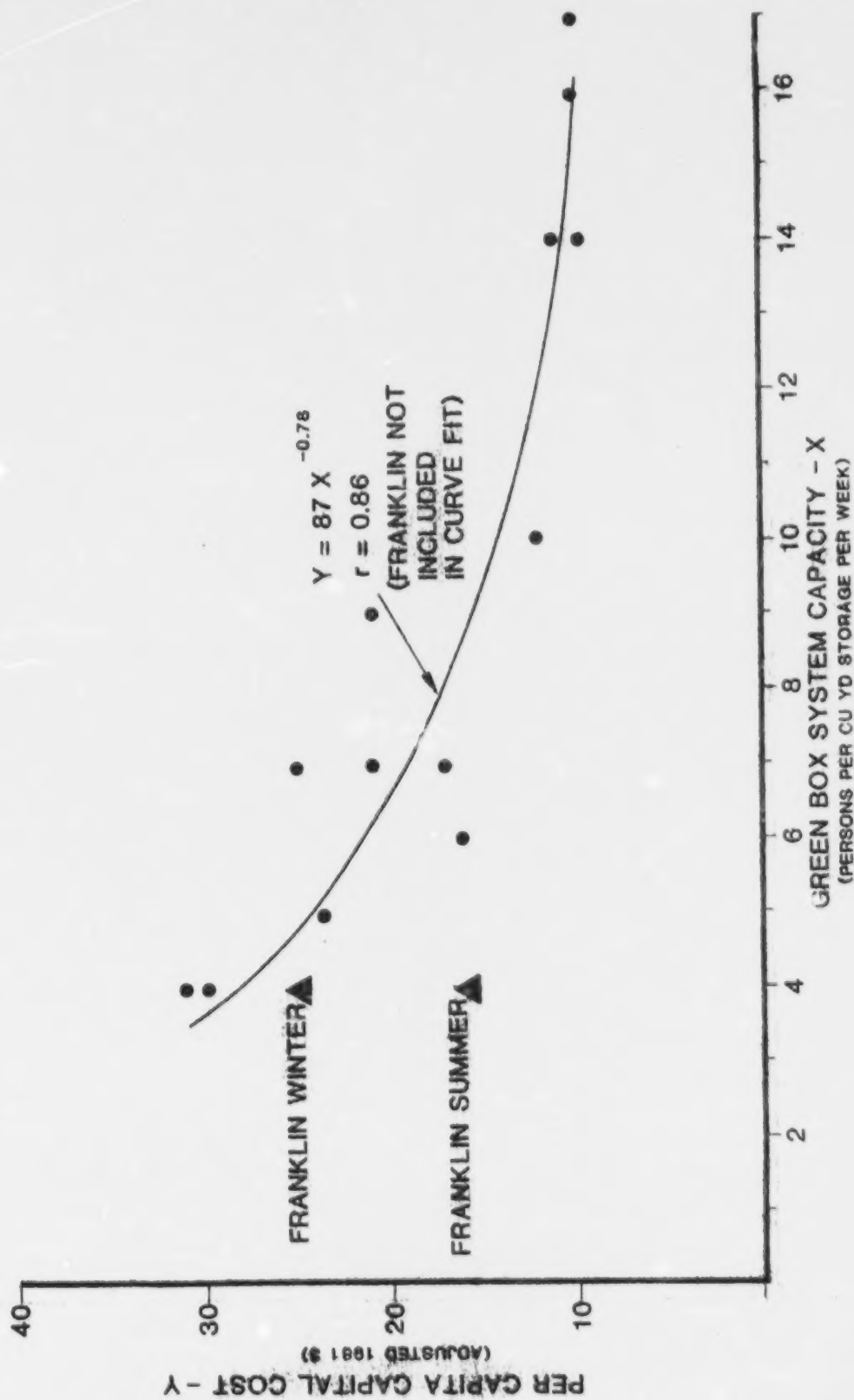


FIGURE 3.1

NOTE: SEE TABLE 3.1 FOR DATA BASE

TABLE 3.2

ANNUAL COSTS FOR PRESENT AND PROPOSED GREEN BOX SYSTEMS

	ESTIMATED 1981 COSTS	
	Present System	Proposed System
	-2 Operating Packers	-1 Operating Packer
	-100 Bins	-167 Bins
	-5-day Collection	-6-day Collection
PACKER VEHICLES		
Capital cost @ \$37,000 ea	\$ 74,000	\$ 74,000 (1)
Vehicle Life	5 yr	7 yr
Annualized capital cost @ 10% per yr return rate	\$19,500	\$15,200
Insurance and taxes @ 6% of equipment cost.	4,400	4,400 (2)
Maintenance @ 12% of equipment cost.	8,900	4,400
Fuel and oil @ \$5,000 per operating vehicle	10,000	5,000
REFUSE BINS		
Capital cost @ \$550 ea	\$55,000	\$ 92,000
Bin life	3 yr	3 yr
Annualized capital cost @ 10% return rate).	22,000	37,000
LABOR		
Number of persons @ average of 2.5 per crew	5	2.5
Direct labor @ \$5/hr	52,000	31,000
Fringe benefits @ 18.3%	9,500	5,700
Personnel overhead @ 13.1%	6,900	4,100
TOTAL ANNUAL COST	\$133,000	\$107,000

1. Life of trucks extended to 7 yr by alternating vehicles.

2. Because only one vehicle is in use at any time, lower insurance rates may be available. This would increase savings for proposed system.

refuse pick-ups and 1 to contend with undeposited refuse. With better anti-litter law enforcement, the County could eliminate the third person on the crew.

Obviously, constant monitoring of every collection site is economically infeasible. However, a consistent program of well-publicized spot checks, occasional undercover surveillance, and sanctions in the form of maximum fines should reduce the amount of litter and, in turn, the need for the third person on the collection crew.

CHAPTER 4

LANDFILL

CHAPTER 4

LANDFILL

Franklin County operates a landfill disposal facility located in the south-central part of the County (1 mile north of Green Point, 13 road-miles from Apalachicola). The County-operated rural collection system, the Apalachicola and Carrabelle municipal collection systems, contract haulers, private citizens and commercial establishments dispose of refuse at the landfill. This chapter outlines current landfill practices and evaluates the environmental and economic issues facing Franklin County.

CURRENT LANDFILL OPERATION

The landfill is operated using an elevated-area fill method. The cells used for general refuse are approximately 65 ft x 65 ft. Eight cells have been completed and closed since the landfill began operations in 1980. Bulky debris (i.e., white goods, construction debris) are filled in an area separate from the general refuse. About 1.5 acres of the 7 permitted acres have been fully utilized so far.

The landfill is staffed with two persons (one supervisor and one equipment operator). Refuse is filled and compacted and cover is spread using a landfill loader/compactor.

There is no tipping fee for disposing waste at the Franklin County landfill. The landfill is open during weekday business hours but the access road gate is locked at all other times. Several 4-cu yd bins are located outside the front gate for after-hour and weekend disposal.

The landfill is located on property which has been loaned to the County by Buckeye Cellulose Corporation. The fill, when completed, will be reforested and returned to Buckeye.

The elevation at the Franklin County landfill ranges from 15 to 20 ft mean sea level (MSL). The topography of the land is relatively flat with average slopes of about 0.2 percent. Although the landfill is surrounded by numerous marshy areas, it is not in a flood-prone area according to the Florida Department of Environmental Regulation's Flood Prone Map.

The landfill site soils (down to 80 ft below grade) consist of medium to very loose sands. The deeper sands are generally looser. The permeabilities of these soils range from 2×10^{-3} to 8×10^{-3} cm/sec.

Groundwater is fairly high at the landfill site with a general west-to-east gradient. The natural seasonal high water table is only about 1 ft below grade; however, the landfill has been dewatered to some extent to comply with a permitting requirement of a 5-ft separation between filled waste and the water table.

ENVIRONMENTAL AND ECONOMIC EVALUATION

The site being used for the Franklin County landfill has, in general, poor natural characteristics for landfilling (i.e., highly permeable soils, high groundwater table and poor surface drainage). These factors tend to promote groundwater contamination because of landfill leachate. Several shallow monitoring wells around the fill, however, have all been dry when checked, according to the site operator.

Though the present Franklin County landfill site has poor natural conditions, it appears that it is typical of much of the property in the County. Significantly better landfill sites may not be available within Franklin County. However, a central sanitary landfill, even on a relatively poor site, is preferable to open dumping, the disposal practice used before construction of the landfill.

To minimize the potential environmental impact of the Franklin County landfill, the operators should follow generally accepted sanitary landfilling practices include:

- o Maintaining a substantial clearance (5-ft minimum) between the filled waste and the groundwater table.
- o Forbidding the disposal of hazardous materials in the County fill.
- o Contouring the final topography of the fill with a moderate slope to promote drainage but not steep enough to cause erosion problems.
- o Minimizing infiltration and erosion with a firmly compacted, grass-seeded cover.
- o Diverting much of the surface drainage as practicable away from the fill area.

As previously stated, the property being used by Franklin County for landfilling is being loaned to the County by a paper company. According to County personnel, more land is available from this company when the present space is filled. As a result, land costs are not a significant economic factor.

The Franklin County landfill is relatively small and, most likely, has a high unit cost (\$/ton filled). Because only minimum staffing and equipment are required, significant cost reductions do not appear possible. Though costly, the landfill performs an important public service by protecting the environment and community.

CHAPTER 5

PROJECTED FUTURE WASTE LOAD AND COMPOSITION

CHAPTER 5

PROJECTED FUTURE WASTE LOAD AND COMPOSITION

Any analysis of waste management procedures must include future waste load projections. This chapter includes estimates of the quantity and composition of waste that will be produced in Franklin County in the next 20 years, based on estimates of increases in population.

ESTIMATED POPULATION GROWTH

A common, but preliminary, way of estimating solid waste production rates is to base the estimates on the local population. Table 5.1 shows the approximate 1980 population for Franklin County and the projected population for the years 1986, 1991 and 2001 (see Appendix B for the methodology used in making these estimates). The Bureau of Census estimate was taken from the Franklin County economic analysis, while the other three estimates were developed using historical population growth data and standard mathematical models. The historic population growth and projected growth are shown graphically on Figure 5.1. The Bureau of Census estimate predicts a higher growth rate (about 1.6 percent per year) than any of the mathematical models.

WASTE LOAD PROJECTIONS

Based on project population growth, future waste production rate projections for Franklin County are outlined in Table 5.2. As outlined in Chapter 2, these rates are based on a production rate of 4 lb/person/day (7-day/week basis), a common figure for areas with minimal industrial activity. On the basis of this analysis it is estimated that about 7,500 to 8,700 tons of refuse will be generated annually in Franklin County by 2001. This estimate could prove to be low if industrial activity in Franklin County increases significantly.

About 19,000 to 22,000 cu yd of refuse will be produced in 2001. These volumes were calculated using a typical in-place landfill density for municipal refuse of 800 lb/cu yd and thus indicate the amount

TABLE 5.1

FRANKLIN COUNTY POPULATION ESTIMATES

	1980	1986	1991	2001
Bureau of Census Estimates	8,600	9,500	10,400	11,900
Arithmetic Growth	-	8,900	9,300	10,200
Constant Percentage Growth	-	9,100	9,700	11,000
Decreasing Rate of Increase Growth	-	8,900	9,300	10,200

Note: The methodologies for calculating future population are described in Appendix B. Bureau of Census estimates are based on data from Franklin County Economic Analysis.

FIGURE 5.1

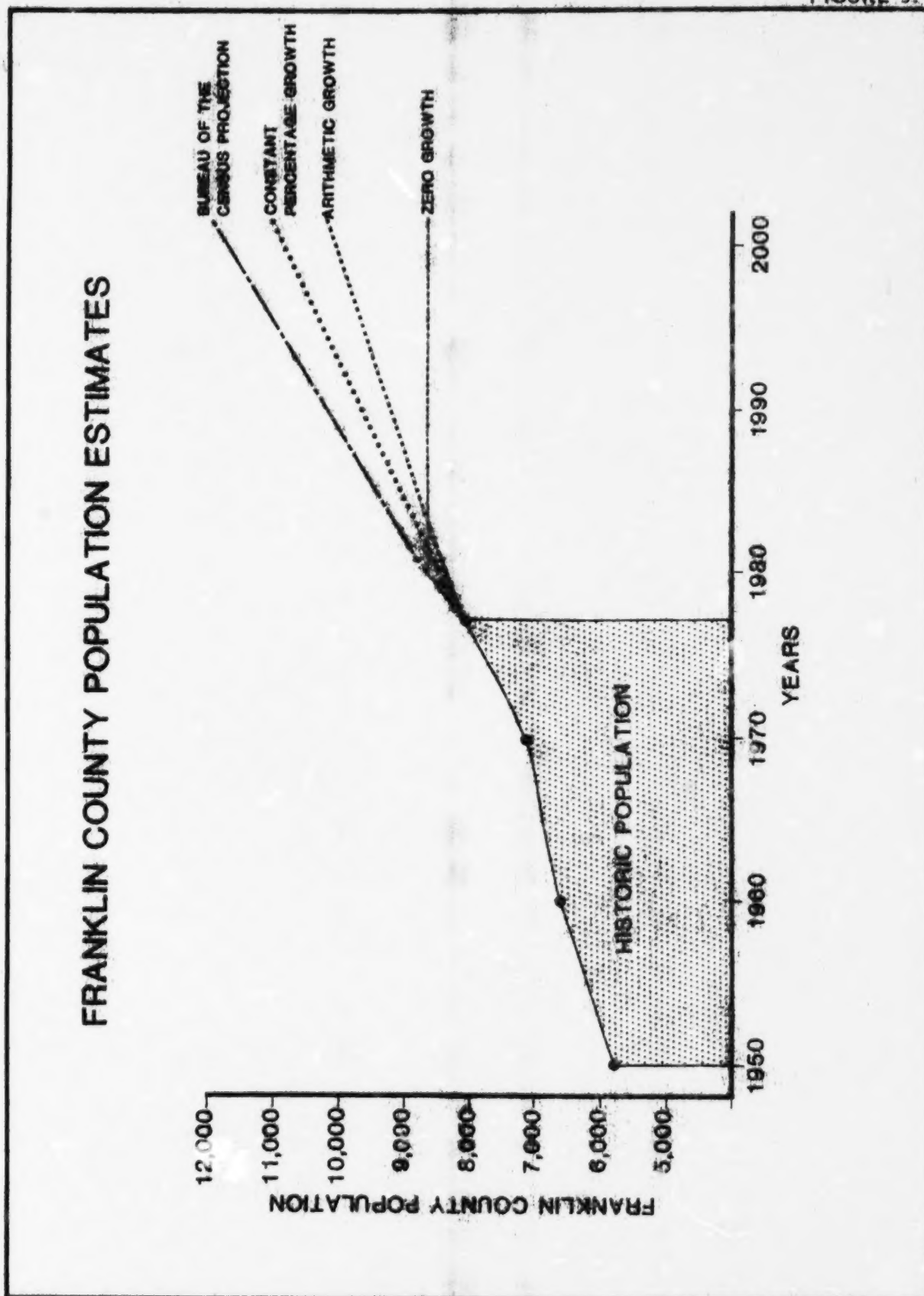


TABLE 5.2

FUTURE WASTE LOAD PROJECTIONS

YEAR	ESTIMATED POPULATION	ESTIMATED REFUSE PRODUCTION ton/yr ⁽¹⁾	cu yd/yr ⁽²⁾
1980	8,600	6,300	16,000
1986	8,900-9,500	6,500-6,900	16,000-17,000
1991	9,300-10,400	6,800-7,600	17,000-19,000
2001	10,200-11,900	7,500-8,700	19,000-22,000

1. Based on a refuse generation rate of 4 lb/person/day (7-day/wk basis). Industrial development could significantly increase these values.
2. Estimated refuse volume in the landfill, based on an in-place density of 800 lb/cu yd.

of landfill volume that will be required. At these waste production rates, Franklin County will fill 1 to 2 acres/year by 2001. The waste generation estimates previously made were based on the permanent population of Franklin County. There is a significant influx of tourists during the summer and Franklin County personnel estimate that the population approximately doubles during the peak summer months. If it is assumed that the peak seasonal population is twice the resident population during three months out of the year, it could increase the projected waste volumes by approximately 25%.

SOLID WASTE COMPOSITION

Characterization data for the Franklin County solid waste stream is not available. Table 5.3 estimates the composition for the years 1980, 1986, 1991 and 2001 based on typical percentages of the components of municipal solid waste. These estimates indicate that less than half of the solid waste consists of recyclable materials (i.e., paper, glass, aluminum and ferrous metals). The recovery and recycling of materials from the Franklin solid waste stream is discussed in detail in Chapter 2.

TABLE 5.3
ESTIMATED FUTURE WASTE STREAM COMPOSITION

WASTE STREAM COMPONENT	PERCENT ⁽¹⁾ OF TOTAL	TONS/YEAR ⁽²⁾			
		1980	1986	1991	2001
Paper					
Newspaper	6	380	400	430	490
Corrugated	8	500	540	580	650
Office paper	3	190	200	220	240
Other paper	15	950	1,000	1,100	1,200
Glass containers	9	570	600	650	730
Ferrous cans	4	250	270	290	320
Aluminum cans	1	60	70	70	80
Other	<u>54</u>	<u>3,400</u>	<u>3,600</u>	<u>3,900</u>	<u>4,400</u>
TOTAL	100	6,300	6,700	7,200	8,100

1. Typical waste stream analysis. "Refuse Report," International City Management Association, Vol. 4, No. 3, 1978.

2. Based on median tonnages in Table 5.2.

CHAPTER 6
EMERGENCY ACTION PLAN

CHAPTER 6

EMERGENCY ACTION PLAN

A number of different emergencies can threaten waste management operations in Franklin County, including hurricanes, tornadoes, landfill fires, and equipment failures. To respond to these emergencies, the County requires an emergency action plan that will minimize disruptions in collection and disposal services and reduce the safety and health hazards that may be associated with natural or mechanical emergencies. This chapter provides an outline of the steps necessary to develop an emergency action plan.

A sample outline for a full-scale emergency action plan is outlined in Table 6.1. Five preliminary steps must be completed before the plan can be considered complete:

Step 1. Appoint Emergency Coordinator and Alternate

The emergency coordinator (and an alternate) will initiate, direct, and review County responses to emergencies that require waste management services.

Step 2. Inventory Available Emergency Equipment

The emergency plan should include a list of available equipment and vehicles, as well as their locations and operators. The inventory should include such sources of equipment as the Franklin County government and public works divisions, municipal agencies, private contractors, and neighboring cities and counties.

Step 3. Maintain Lists of Emergency Personnel

The emergency plan should include regularly updated lists of the available work force, addresses, and phone numbers, as well as names and addresses of state, federal, and private disaster relief agencies. The skills and abilities of County personnel should also be listed.

TABLE 6.1

SOLID WASTE MANAGEMENT EMERGENCY ACTION PLAN OUTLINE

1. Introduction
 - a. Purpose of the document
 - b. Authority for the document
 - c. Information on Franklin County (including maps showing roadways, town locations and other key pieces of information).
2. Emergency Response Chain of Command
 - a. Emergency Coordinator
 - b. Alternate Emergency Coordinator
 - c. Chain of Command - emergency authority lists
 - i. police department
 - ii. fire department
 - iii. emergency medical agencies (ambulance, hospital, etc.)
 - iv. solid waste management department
3. Inventory and Assessment of Equipment and Vehicles
 - a. Franklin County, Solid Waste Division
 - b. Other county public works divisions
 - c. County municipal agencies
 - d. Surrounding counties and municipalities
 - e. Private contractors
 - f. Other sources
4. Available Work Force
 - a. Regular county employees: names, skills/abilities, points of contact
 - b. Local municipal employees: names, skills/abilities, points of contact
 - c. Temporary personnel: names, skills/abilities, points of contact
 - d. Federal disaster personnel (National Guard, etc.)
5. Emergency Funding and Planning Assistance
 - a. State agencies
 - b. Federal agencies
6. Emergency Action Measures: Response Outlines
 - a. Severe storm response
 - b. Flood response
 - c. Landfill closure response
 - d. Equipment failure response
 - e. Insufficient labor response
 - f. Widespread fire response

Step 4. Identify State and Federal Emergency Relief Agencies

An investigation of additional emergency funding should be carried out to determine availability and levels of assistance from state and federal agencies, such as the State Office of Disaster Preparedness in Tallahassee and the Federal Disaster Assistance Administration, for both financial and planning assistance.

Step 5. Establish Priorities for Responses to Various Types of
Emergencies

Different kinds of emergencies require different levels of response. A comprehensive emergency action plan should outline the necessary responses to various potential emergencies in order of their importance. For example, the following procedures might reflect the responses to a severe storm or hurricane.

1. Activate the Emergency Action Plan by notifying of the emergency coordinator and the alternate.
2. Notify appropriate state and federal officials and advise them of the situation. Begin steps to secure any needed assistance.
3. Carry out a cursory overview of damage followed by an in-depth assessment. Rate the severity of damage to individual sites, including:
 - a. Clogged storm drainage channels
 - b. Blocked public roads
 - c. Debris on land immediately surrounding private residences
 - d. Damaged public lands and buildings.
4. Formulate an integrated and comprehensive response based on the severity ratings assigned in Step 3.
5. Obtain the work force and equipment necessary to provide the response.
6. The response procedures might be in the following order:
 - a. Open clogged storm drainage channels where feasible.
Be certain to consider the impact of backed-up water on downstream locations. Clear those channels nearest the Gulf first and work inland to minimize downstream impact.

- b. Clear public roads to allow for the transportation of all necessary vehicles. Repaving, pothole repair and curbwork should be delayed until most roads are passable.
 - c. Clear private property for 50 feet around residences to eliminate fire hazards and prevent rodent and vector infestations that may threaten public health. Repair to damaged houses should not be carried out; homeowners insurance will cover this work by private contractors.
 - d. Clear the grounds and interiors of public buildings damaged by the storm; raze heavily damaged buildings if necessary.
7. Establish appropriate disposal areas. The Office of Solid Waste (in the Florida Department of Environmental Regulations) may permit open burning, On a case-by-case basis. Private logging and paper companies may purchase downed trees at a discount or for the breakeven cost of removal. Open trenches for emergency material disposal may also be allowed by the Office of Solid Waste and may be located on either public or private lands.

Once a plan is developed, copies should be distributed to all appropriate personnel. A looseleaf binder format is the best format for incorporating changes in procedures and revised personnel lists.

APPENDIX A
EVALUATION OF ENERGY RECOVERY TECHNIQUES

APPENDIX A

EVALUATION OF ENERGY RECOVERY TECHNIQUES

As outlined in Chapter 2, several energy recovery techniques were considered and rejected during the preliminary feasibility study. Each method--incineration for steam production, methane production, and shredded waste to produce solid fuel--and the reason it is inappropriate for Franklin County is outlined briefly in this appendix.

INCINERATION

Incineration is the controlled burning of waste materials to produce hot water and/or steam. Power can be produced from the steam in gas turbines or the steam/hot water can be used directly for heating purposes. Although energy recovery from incineration is economically viable, markets for the energy (heat) must be close to the source (within 1 mile) for the recovery of heat to be economical. Two types of heat recovery systems can be used on existing and planned refuse incinerators: "add-on" units designed to operate on exhaust gases from refractory-lined furnaces and integral water-tube wall units.

Two factors preclude the use of incineration as a method of resource recovery in Franklin County: the limited amount of refuse and the technical restrictions on siting a steam-generating plant near the only current potential energy market.

The County produces 6,000 tons of refuse/year, which is not enough to generate steam as efficiently as a larger plant. Although it could produce 2 lbs steam/hr per pound of waste (2,800 lbs steam/hr at 150 psi), the steam cannot be efficiently piped more than 1 mile. This amount of steam would be adequate to heat housing units on St. George's Island, but the incinerator cannot be located on the island because of flood and hurricane potential. Because the nearest possible incineration site is more than 1 mile from the island, the generation of steam from refuse for space heating is not technically feasible for Franklin County.

METHANE PRODUCTION

Methane is produced naturally by large masses of rotting organic waste. Some large landfills have been capped and gas wells sunk to draw off the methane, which is used to supplement natural gas supplies.

Methane gas production by anaerobic breakdown is not a feasible resource recovery option because of the relatively low volume of organic waste produced by Franklin County. Even a marginally economical methane system requires large volumes of organic waste.

SHREDDED WASTE AS SUPPLEMENTAL FUEL

European incinerators equipped with waste heat boilers have used shredded refuse as a source of fuel to generate electricity from steam for many years. In the United States the use of solid wastes as fuel is less common. Several large municipal incinerators use mixed municipal refuse to generate steam for internal plant use or sale with no attempt to control refuse particle size or composition. Auxiliary fuels, such as oil or gas, are used in some units to assist in controlling steam pressure and temperature.

Municipal waste can also be used as a fuel supplement in utility boilers. Though such use is always possible in theory, economic considerations have limited the number of utility plants prepared to handle such wastes.

Again, there are no nearby markets for shredded waste as supplemental fuel from Franklin County. The closest utility boiler identified in the market survey is Georgia Power's Plant McDonough, near Atlanta about 300 miles from Franklin County. As shown in Appendix C, any refuse haul exceeding 70 miles one way (140 miles round trip) is not economically justifiable. It is unlikely that any boiler within this 70 mile radius would be capable of accepting Franklin County's wastes. For a significant cost benefit from waste hauling (say, \$100 per truckload) the maximum one-way radius is reduced to 38 miles. No boiler within this radius is currently capable of handling Franklin County's solid waste.

APPENDIX B

METHODOLOGY FOR ESTIMATING FRANKLIN COUNTY POPULATION GROWTH

APPENDIX B
METHODOLOGY USED IN ESTIMATING FRANKLIN COUNTY POPULATION GROWTH

Refuse production estimates throughout the report are based on a production rate of 4 lb/person/day. Estimates of future refuse production in Chapter 5 are based on estimates of Franklin County population in 1986, 1991, and 2001. The four methods of calculation used to estimate future population are outlined in this appendix: a county economic analysis, arithmetic progression, constant percentage growth rate, and decreasing rate of increase.

Data for these calculations were derived from "Franklin County Economic analysis," published by the Bureau of Economic Analysis, Division of Economic Development, Florida Department of Commerce (January 1980). Procedures for estimating population growth were drawn from Water Supply and Pollution Control, by J. W. Clark, W. Viersman, and M. J. Haurmer (3rd ed., 1970), published by IEP-A Dun-Donnelly.

The following variables are used in the equations in this appendix:

- F = constant percentage growth rate factor
- k_d = decreasing rate constant
- POP = population of Franklin County
- Z = limiting population

COUNTY ECONOMIC ANALYSIS PROJECTED POPULATION GROWTH

<u>Date</u>	<u>Population</u>
1950	5,814
1960	6,576
1970	7,065
1977	8,128
1980	8,600
1990	10,200
2000	11,800

The 1950-1977 figures are based on census data; 1980-2000 estimates projected from County economic analysis. Using this methodology, Franklin County population estimates for the intervals considered in the preliminary study are:

$$1986 = 9,500$$

$$1991 = 10,400$$

$$2001 = 11,900$$

ARITHMETICAL PROGRESSION

The following calculation uses average annual arithmetic increase for time period 1950 - 1977 to estimate future populations.

$$\text{Annual Change} = \frac{8128-5814}{27} = 86/\text{yr}$$

$$\text{POP (1986)} = [86(86-77)] + 8128 = 8,900$$

$$\text{POP (1991)} = 9,300$$

$$\text{POP (2001)} = 10,200$$

CONSTANT PERCENTAGE GROWTH RATE

The following calculation first determines average annual growth percentage for the 1950-1977 period, then estimates population in 1986, 1991, and 2001.

$$\text{POP (1977)} = \text{POP (1950)} \times F^{27}$$

$$8128 = 5814 \times F^{27}$$

Solving for F yields

$$F = 1.0125$$

Average annual population growth is 1.25 percent

$$\text{POP (1986)} = 8128 \times (1.0125)^{86-77} = 9,100$$

$$\text{POP (1991)} = 9,700$$

$$\text{POP (2001)} = 11,000$$

DECREASING RATE OF INCREASE

The following calculation estimates future population for Franklin County based on the assumption that 16 percent of land area (about 270,000 acres) is inhabitable @ 5 people/acre.

$$Z = 220,000$$

Calculate K_d over interval 1950-1977

$$K_d = \frac{-\ln[(220,000-8,128)/(220,000-5,814)]}{(77-50)}$$
$$= 4.02 \times 10^{-4}$$

$$\text{POP (1986)} = 8,128 + (220,000 - 8,128) (1 - e^{-K_d \times 9})$$
$$= 8,900$$

$$\text{POP (1991)} = 9,300$$

$$\text{POP (2001)} = 10,200$$

APPENDIX C

METHODOLOGY FOR CALCULATING MAXIMUM ECONOMIC HAUL

APPENDIX C

METHODOLOGY FOR CALCULATING MAXIMUM ECONOMIC HAUL

The economic feasibility of selling recyclable refuse or shredded MSW to energy markets depends on the costs associated with transporting the refuse to the market. This appendix outlines the calculations used to determine the maximum distance refuse can be economically hauled by Franklin County.

Cost benefit of truckload of municipal waste:

$$\frac{(40,000 \text{ lbs waste})}{(\text{truckload})} \times \frac{(4500 \text{ BTU})}{(\text{lb.waste})} \times \frac{(\$1.30^*)}{(\text{million BTU})} = \frac{\$234}{\text{truckload}}$$

*Equivalent-to-coal worth; actual payback from utility would be lower.

Maximum economic haul:

$$\frac{(\$234)}{(\text{truckload})} = 136 \text{ miles total truckload or } \frac{68 \text{ miles, one-way radius}}{\text{truckload}}$$
$$\frac{(\$60/\text{hr})}{(1/35 \text{ mph})}$$

C-2